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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,203	06/26/2003	Tan Tzyy Haw	42P16893	7332

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EXAMINER

JOHNSON, JONATHAN J

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/609,203	Applicant(s) HAW ET AL.	
	Examiner Jonathan Johnson	Art Unit 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-15, 17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-15, 17 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7, 11, 15, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (6,564,986) in view of Stewart et al. (US-2003/0170450). Hsieh teaches determining an area of weakness in a ball grid array (BGA) package having an array of solder balls', an integrated circuit (IC) device', a first surface coupled with the IC device; a printed circuit board (PCB) having a second surface, the second surface aligned with the first surface using the array of solder balls, wherein the array of solder balls placed in between the first surface and the second surface; and solder joints to attach the array of solder balls with the first surface and the second surface (abstract; column 2, lines 53-64 and Figures); the area of weakness comprises at least one of the following: edges, corners, and perimeter of the BGA package (Figure 3C and column 2, lines 53-64), determining an area of weakness in a ball grid array, (BGA) package (abstract; column 2, lines 53-64 and Figures); determining an area of weakness in a ball grid array (BGA) package (abstract; column 2, lines 53-64 and Figures). Hsieh fails to teach applying a bonder to the area of weakness in the BGA package, wherein the bonder is applied independently of the array of solder balls', the applying of the bonder comprises applying the bonder between the first surface and the second surface to provide resistance to the BGA

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package against warpage, the warpage comprises at least one of the following: opening, cracking, curving, bending, and breaking of the second surface', the bonder comprises at least one of the following: a thermoplastic bonder and a silicon bonder; applying a thermoplastic bonder to the area of weakness between a first surface and a second surface in the BGA package', printing solder paste to create a BGA package; placing surface mount technology (SMT) on the BGA package using the solder paste; solder reflowing; solder waving; and processing backend', applying a silicon bonder to the area of weakness between a first surface and a second surface in the BGA package', applying the silicon bonder prior to solder reflowing. Stewart et al. teaches applying a bonder to the area of weakness in the BGA package, wherein the bonder is applied independently of the array of solder balls (paragraphs 81,109-111,114); where the bonder is a bonder ball (figure 11, item 5) and the bonder balls are applied surrounding the solder balls (figure 11, item 5) the bonder comprises at least one of the following: a thermoplastic bonder and a silicon bonder (paragraphs 58,77,81,109-111,114); applying a thermoplastic bonder to the area of weakness between a first surface and a second surface in the BGA package (paragraphs 58,77,81,109-111,114); applying a silicon bonder to the area of weakness between a first surface and a second surface in the BGA package (paragraphs 58,77,81,109-111,114); applying the silicon bonder prior to solder reflowing (paragraphs 58,77,81,109-111,114) With respect to claims 3-4, the adhesive of Stewart et al. would prevent warpage. At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the bonder application of Stewart et al. with the defect determining method of Hsieh in order to 'reinforce a solder ball bond with an adhesive bond when repairing a BGA.

Claims 6, 8-10, 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (6,564,986) and Steward et al. (US-2003/O170450) as applied to claims 1 and 11 above, and further in view of Austin et al. (6,284,173). Hsieh and Stewart et al. teach all of the limitations of the claims except applying the bonder using a bonder dispenser', the applying of the bonder comprises applying the thermoplastic bonder using a hot melting jig or a dispenser', the applying of the bonder comprises applying the silicon bonder using an epoxy dispenser machine', the independent application of the bonder is performed using software to control placement distance of the bonder with respect to the array of solder balls. Austin et al. teaches applying the bonder using a bonder dispenser; the applying of the bonder comprises applying the thermoplastic bonder using a hot melting jig or a dispenser; the applying of the bonder comprises applying the silicon bonder using an epoxy dispenser machine', the independent application of the bonder is performed using software to control placement distance of the bonder with respect to the array of solder balls (abstract; column 3, lines 38-62, column 4, lines 29-46, and column 7, lines 41-53). At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the encapsulant dispenser of Austin et al. with the determining method of Hsieh and the bonding method of Steward et al. in order to precisely position the encapsulant when repairing a BGA.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh (6,564,986) and Stewart et al. (US-2003/0170450) as applied to claim 11 above, and further in view of Longgood et al. (6,045,032). Hsieh and Steward et al. fail to teach that the thermoplastic

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bonder is applied after solder waving, however, Steward et al. teaches applying thermoplastic adhesive after the application of solder paste to the components being bonded (paragraphs 81,83,109-111,114): Longgood et al. teaches applying solder material to a BGA by solder waving (abstract, Figures, column 1, Line 34-column 2, line 19., and column 3, Line 31-column 4, line 67). At the time of the invention it would have been obvious to one of ordinary skill in the art to substitute the solder application method of Longgood et al. for the solder application method of Stewart et al. and Hsieh in order to pretin the circuit board without a subsequent heating operation to melt the solder paste of Steward et al.

Response to Arguments

Applicant argues Stewart does not teach applying the bonder to the "parameters of the BGA package" as required by claim 1. the examiner disagrees. Figure 11, item 5 of Stewart shows a bonder (item 5) being applied near the periphery (parameter) of the BGA package.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 571-272-1177. The examiner can normally be reached on M-Th 7:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Johnson
Primary Examiner
Art Unit 1725

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